

## ABSTRACT

A multi-sensor, multi-actuator control system for controlling vibration in a mechanical structure. The system employs feedforward and feedback control strategies in tandem. Outputs from adaptive feedforward and modal feedback control loops are added to each other. The control system may be dynamically adapted to the changing physical characteristics of the controlled structure. For example, the plant transfer function estimates for the feedforward unit and the gain for the feedback unit may be calculated as functions of sensed physical parameters (location, mass, etc.), and the plant transfer function estimates may be dynamically modified to reflect time-varying feedback control gains. If desired, the control system may be used to cancel low frequency vibrations ( $< 20$  Hz) in industrial processes. The actuators may be formed of electromagnets, fixed armatures and interposed flux sensors. In a preferred embodiment of the invention, the robust actuators are sealed so as to be impervious to fluids and dust.